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Scaffolding genre knowledge and metacognition: insights from an L2 doctoral research writing course

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Abstract

This study investigates how genre knowledge and metacognition can be scaffolded in a genre-based course for doctoral students engaged in writing research articles. We argue that current definitions of genre knowledge development encompass the development of metacognition, and thus adopt an inter-disciplinary approach to illustrate how metacognition—specifically metacognitive knowledge—can be scaffolded in the genre classroom. We developed two tasks for this purpose. In the first, students were asked to describe their writing context and genres. For the second task, at the end of the course, students submitted a visual conceptualization of the research genres in their specific scientific community. This visualization was accompanied by an account of students' observations about genre, and a reflection on how these insights could be applied to their ongoing writing situation. Students were also interviewed two to six months after the course to explore how they reported using genre knowledge in their writing. Results showed that the metacognitive tasks elicited an integrated view of genre and encouraged students' conceptualization of this knowledge as a tool for writing. In interviews, students reported using facets of genre knowledge metacognitively in their writing, by describing how they engage with reader expectations, conventions, variation, and the possibility of strategic deliberate choices.

Key words:

EAP, academic writing, genre pedagogy, task, metacognitive knowledge

1. Introduction

In her recent volume examining genre innovation, Tardy (2016, p. 129) observes that “excluding genres from the classroom is not really an option, as they are the primary means through which humans communicate in writing”. Indeed, within L2 writing, genre-based approaches have proven to be an effective pedagogy through attention to discoursal features, particularly with graduate students (Cheng, 2011; Hyland, 2007; Swales, 1990, 2004). English for Specific Purposes genre-based pedagogies have emphasized the importance of raising students’ “rhetorical consciousness” (Swales, 1990, p. 213), i.e. their awareness of textual and rhetorical features achieved through analysis tasks. In this study, we argue that the development of genre knowledge comprises the development of metacognition, that metacognition has indeed been implicit in most definitions of genre knowledge and genre awareness, and finally that metacognitive instruction in the genre classroom should be deliberate and inspired by the research on metacognitive development. Thus, we adopt an inter-disciplinary approach to show how metacognition can be implemented in the genre classroom, and to provide a road map of relevant theory and research for genre teachers and researchers within L2 writing.

The concept of metacognition has often appeared indirectly in different guises in the genre literature. For example, Swales’ (1990) emphasis on the need to raise students’ rhetorical consciousness seems to entail both students’ awareness of genre features, and their understanding of how to use this knowledge in their own writing. Similarly, Johns (2015, p.116) juxtaposes genre awareness with acquisition in L1/L2 genre writing pedagogy by defining it as “developing the rhetorical flexibility necessary for adapting their previously-held socio-cognitive genre knowledge (‘schemas’) to ever-evolving contexts”. This emphasis on consciousness, flexibility and adaptation entails metacognition: Adapting knowledge and strategies requires a realization of what we know, and how we (can) use this knowledge in different situations or under different conditions (Schraw, 2001).

Metacognition has been linked to students’ ability to accurately evaluate their written work (Hawthorne, Bol, & Pribesh, 2017; Negretti, 2017), to successful transfer of writing skills across the curriculum (Anson & Moore, 2016), and to authorial identity (Clark, 2016). Further, the fact that metacognition is part of genre awareness development has been addressed explicitly by authors such as Johns (2011, p. 63):

“L2 writing instructors, in particular, need to encourage questioning of a task and critical reflection that augments student ‘mindfulness’ or metacognition ... leading, if possible, to high transfer of their thinking and learning to new, or evolving, genres, writing processes, and writing contexts”

Clearly, there is fertile ground in genre studies for investigations into how metacognition can be promoted in the L2 genre classroom. Here, we argue that current definitions of genre knowledge/genre awareness encompass the development of metacognition, especially when translated into the kind of learning that we hope to foster in our students and the pedagogical practices that promote this learning. The argument was first proposed in an earlier study (Negretti & Kuteeva, 2011). This article takes a step further in clarifying the conceptual overlaps between genre knowledge, genre awareness and metacognition.

Expert genre knowledge, as Tardy (2016) explains, is an understanding of a specific genre, and is multidimensional: a “very sophisticated (though not necessarily conscious) understanding of many textual, social, and conceptual areas. This knowledge is drawn upon when writers *manipulate and exploit genres for their own purposes*” (p. 142, emphasis added). Tardy (2009) thus characterizes the development of this expertise as building and

integrating knowledge of various genre knowledge domains – from content knowledge to social, procedural and textual areas (Fig. 1). As writers develop expertise, for example, formal features will be associated with specialized content and specific audiences, as well as an understanding of the writing process.

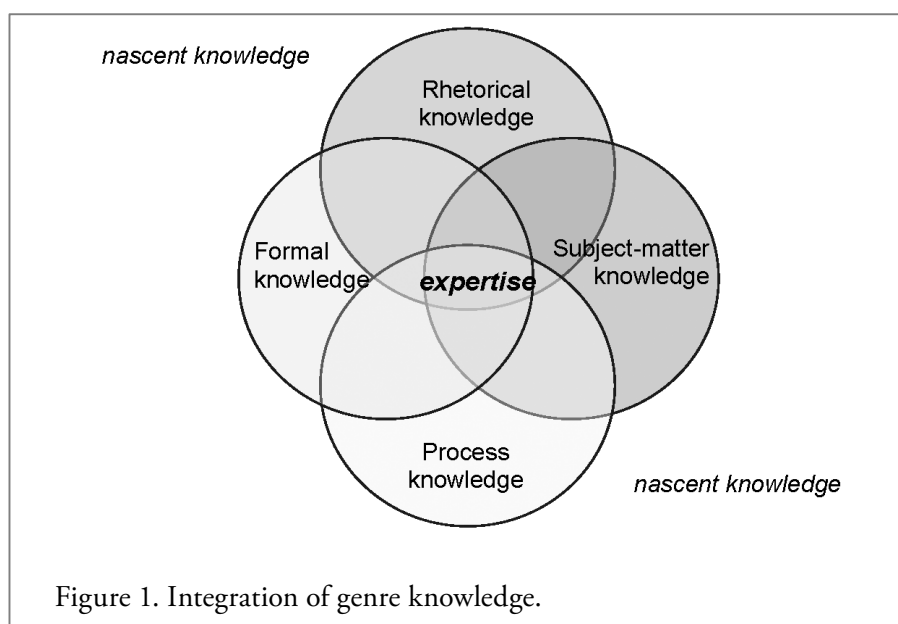


Figure 1. Tardy's (2009) model of genre knowledge as writing expertise. From *Building Genre Knowledge* by Christine Tardy (Parlor Press, 2009). Used by permission.

While experts may be able to draw upon this knowledge unconsciously, we concur with Johns (2011) that for learners, this knowledge needs to be made metacognitive in order for them to learn to draw upon it and manipulate it effectively.

In contrast to genre knowledge, genre awareness (Johns, 2011) is not specific to a single genre, but is an “explicit or conscious understanding” (Tardy, 2016, p. 143). Teaching genre awareness then means promoting attention towards variation across and within genres, and the ability to consciously adapt this knowledge as contextual and social conditions vary. This view is emphasized by Devitt (2015, p. 46, emphasis added): “Teachers approach genre instruction through analysis, but *more advanced learning* happens through practice, feedback from experts in the genre, *reflection*, and then practice again.” She then asks: “How do we help learners move on to *the independent judgments* that they can and must make in their unique responses to writing tasks?”. Thus, genre knowledge and genre awareness definitions demand that in our teaching we help students learn to manipulate genres, adapt their knowledge of genres to different contexts, and evaluate the effectiveness of their choices in light of what they know about genres: This is effectively asking them to engage in metacognition. Writing has long been depicted as both a cognitive and metacognitive activity (Flower & Hayes, 1981), and indeed Hayes’ (2012) cognitive model of writing underscores that metacognition is needed for writers to orchestrate knowledge and strategies to meet the specific objectives and constraints of the writing task (Escorcia, Passerault, Ros, & Pylouster, 2017).

Overall, the picture that emerges is that writing instruction aiming to develop genre knowledge and/or awareness should include the development of metacognitive abilities. The pressing question is, how can this be achieved? What can we borrow from theory and research on metacognitive instruction? What kind of tasks promote the concurrent development of genre knowledge and metacognition? Genre teachers—whether aiming for knowledge or

awareness—may already provide students with tasks that scaffold metacognition. Yet, metacognitive development has not been a preoccupation of genre researchers, and few studies in L2 genre have investigated the role of metacognition in genre-based academic writing (Linares-Cálix, 2015; Negretti, 2017; Yeh, 2015). A longitudinal study with FL participants (Linares-Cálix, 2015) using reflective matrices, showed promising but limited improvements in reading and writing performance, raising the question of what types of tasks are conducive to learning in different L2, genre-based writing contexts. Negretti's (2012) work has indicated that metacognitive awareness of the rhetorical dimensions of a writing task connects to different self-regulatory strategies that students use, and that students who develop conditional metacognitive knowledge of academic genres seem to be able to use this knowledge in their writing (Negretti & Kuteeva, 2011). Recently, using an online writing system, Yeh (2015) suggested that metacognitive scaffolds requiring students to recognize and use genre features led to improved academic writing performance. Indeed, qualitative differences in metacognitive judgments seem to explain why even advanced L2 writers may or may not accurately recognize the rhetorically effectiveness of their text (Negretti, 2017).

Thus, in this study, we report on the results of a small-scale qualitative study that investigates how metacognition can be scaffolded in the writing for research, ESP-based genre classroom with L2 doctoral students in the sciences. While a previous study (Negretti & Kuteeva, 2011) asked how genre analysis can promote different facets of metacognitive knowledge, this study focuses on how promoting metacognitive knowledge can enhance different facets of genre knowledge. To this end, we developed tasks that concurrently prompt students to integrate different facets of genre knowledge (Tardy, 2009) and render this knowledge metacognitive through various metacognition training heuristics (Serra & Metcalfe, 2009). This data is complemented with post-course interviews, conducted to better understand if and how students report using genre knowledge metacognitively in their writing. More specifically, we ask:

RQ1. To what extent and how does the implementation of metacognitive tasks enhance students' development and integration of various facets of genre knowledge? (content, rhetorical, process, and formal knowledge)

RQ2. How do students report on the metacognitive use of their genre knowledge for research writing beyond the course?

2. Theoretical Framework and related research

Metacognition is a multifaceted construct (Veenman, Van-Hout Wolters & Afflerbach, 2006) (see Fig. 2), and is typically defined as the mental ability to think about knowledge (Serra & Metcalfe, 2009). It includes two components: a) our knowledge of concepts, ourselves, the task at hand and strategies we are using (metacognitive knowledge); b) planning and setting goals, monitoring, and evaluating our performance and learning (metacognitive regulation) (Brown, 1978; Flavell, 1979; Pintrich 2002; Schraw & Dennison, 1994). Research in educational psychology has demonstrated that when these different facets of metacognition are optimized, students' learning and ultimately performance are improved (see Schraw, 2001; Serra & Metcalfe, 2009). The metacognitive model developed by Nelson & Narens (1990) explains this process as a learning cycle: As we engage in a cognitive activity, information is constantly exchanged between the object-level (cognition) and our monitoring and control of our thinking (meta-level, or metacognition), which in turn improves the quality of our cognition. In this model, activating and consolidating metacognitive knowledge—what we know about the task, its conditions, and our strategies to solve it—is essential for effective regulation of our thinking.

Our study focuses on metacognitive knowledge. Metacognitive knowledge comprises three dimensions: declarative knowledge, procedural knowledge and conditional knowledge. In other words, awareness of *what* we know (declarative knowledge), *how* to apply it (procedural) and *why* it is relevant to the current learning conditions (conditional) (Schraw & Dennison, 1994). It can include “information about the cognitive task at hand, about one’s ability to perform that task, or about potential strategies one might use to perform that task” (Serra & Metcalfe, 2009, p. 278). In this study, scaffolding metacognitive knowledge means helping students reflect on what they know about genres, how this impacts their research writing, as well as how they use this genre knowledge in their own writing. In simple terms, “this is what I know about genres”, “this is how I use this knowledge in my writing”, and “why”.

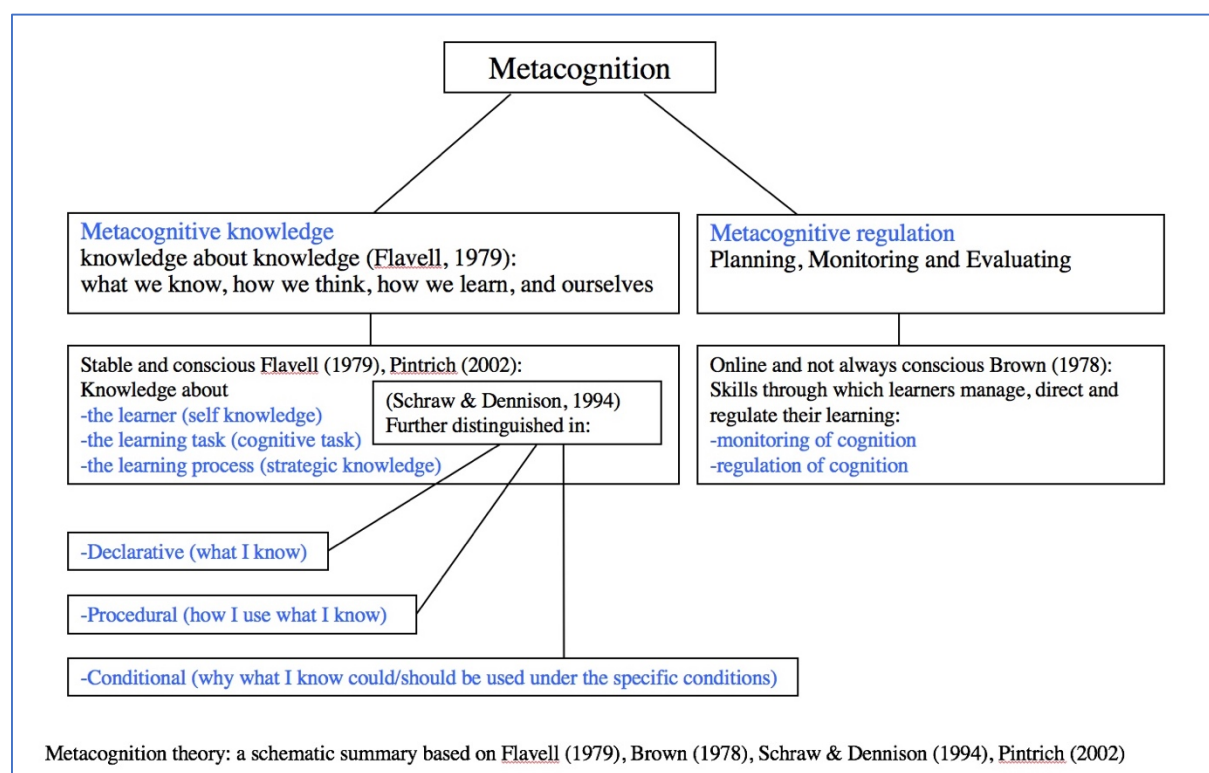


Figure 2. Metacognition framework. The figure aims to illustrate the complexity of the theory and provide a reference for the reader. It entails some simplification and does not imply hierarchical relationships.

Writing includes both cognitive and metacognitive processes. Metacognition in writing can be conceptualized as “a generic concept that refers to both knowledge and strategies that the writer uses to manage his/her cognitive processes during writing” (Escorcia et al., 2017, p. 235; Gorzelsky, Driscoll, Paszek, Jones & Hayes, 2016). Metacognitive knowledge specifically has been linked to writing performance both in L1 and L2 (Schoonen et al., 2011), as well as writers’ ability to monitor and control their strategy use during writing and to accurately evaluate the quality of their work (Hawthorne et al., 2017). However, writing research has focused primarily on metacognitive regulation (planning, monitoring and evaluating) and writing proficiency (e.g. Ong, 2014; Van den Bergh & Rijlaarsdam, 2001). Little research has investigated how to promote metacognitive knowledge in the genre classroom. This is a missed opportunity, especially in light of the definitions of genre knowledge/awareness discussed in the introduction.

Developing metacognition requires training (Dunning, Johnson, Ehrlinger, & Kruger, 2003), just like the development of genre knowledge. Fortunately, research has shown that metacognition can be enhanced by a variety of scaffolding techniques (Gutierrez de Blume,

Wells, Davis, & Parker, 2017; Schraw, 2001). Among the proposed methods and heuristics (Serra & Metcalfe, 2009), the first step is to make knowledge visible to the learners, typically through verbalization. Here, the work of van de Kamp and colleagues (2015, 2016) is relevant to illustrate how to implement a metacognitive knowledge in a content course—in their case visual arts. In their approach, metacognitive instruction entails various steps, including the development and activation of existing subject knowledge, as well as the consolidation and reflection on how this knowledge affects students' own practices. Thus, in a genre-based course, scaffolding metacognitive knowledge requires making genre knowledge accessible and visible to the students, by asking them to verbalize and/or represent conceptually what they know about genres, how they use this knowledge, and why.

3. Methodology

3.1 Research setting

The course involved eight L2 English doctoral students in the sciences enrolled at a Swedish technical university, with approximately 1,100 PhD students employed across 32 graduate schools (Gustafsson, Eriksson & Karlsson, 2016). Eligibility requires a master's degree or an equivalent number of credits, and does not include any English language requirements, making it difficult to establish the proficiency of the participants. However, since 2007 all master's programs have been delivered in English, as are the doctoral programs. It is safe to assume an advanced proficiency, at least in reading and writing, for all the participants. The doctoral students who have obtained a bachelor and possibly a master's degree at the university have likely been exposed to pedagogical interventions on academic writing in English within their program, while students coming into the PhD from a different educational background may have a varied expertise (Gustafsson et al., 2016).

The course that served as the setting of this study is one of the several “general transferable skills” courses that are offered to doctoral students, and is the one that delves more in depth into academic research writing adopting a genre analysis approach (e.g. Swales & Feak, 2012). It is a well-established course in the university. The students meet once a week for eight weeks, and besides analysis and discussions of various examples of research publications from their disciplines, they engage in a cycle of writing, peer-feedback and revision of four writing assignments, which correspond to parts of a research article they are in the process of writing. Many of these doctoral students may have internalized the conventions of the disciplinary discourse they are steeped in. As such, the course aims to facilitate a discussion of these “givens” to promote an awareness of variation and individual options, to avoid students regarding “a rhetorical model as prescriptive and ... los(ing) sight of the issue of disciplinary context, credibility, and knowledge formation in any given [article] contribution” (Gustafsson et al., 2016, p. 262).

Table 1 below reports relevant details about the study's participants. Some of them have more years under their belts, and seem to have had more experience of publishing research writing. However, it is difficult to determine what this means for the individual student, since publications in many scientific fields are a collaborative authorial effort, and genres other than the article may be preferred (conference paper, reports). Furthermore, expectations about the nature and number of publications vary considerably across areas of specialization and the theoretical/applied continuum. Therefore, the numbers reported below should not necessarily be equated with research writing experience. For the purpose of this study, the most important aspect to underscore is that for the more academically senior participants, our tasks potentially elicited aspects of genre knowledge that they already had, albeit unconsciously (Tardy, 2016), while for others, genre insights may have been built through the course tasks.

Table 1. Background information about the participants

<i>Participant</i>	<i>Discipline</i>	<i>Approx. years in PhD</i>	<i>Previous publications*</i>
P2	Industrial and Materials Science	1,5	2 + MS thesis at same uni
P3	Industrial and Materials Science	1	3 + MS thesis at same uni
P4	Mechanics	1,5	4 + MS thesis at same uni
P5	Chemistry	2	4 + MS thesis at same uni
P6	Industrial and Materials Science	1,5-2	2
P7	Computer Science	1	1
P8	Physics	3	19 + MS thesis at same uni
P9	Mechanics	4	13 + MS thesis at same uni

**Note: Publications include conference proceedings, technical reports and posters. All publications are in English.*

3.2 Task design – data collection

In genre pedagogy, the centrality of tasks has long been underscored (Swales, 1990; Tardy 2009). Tasks have typically involved genre analysis, albeit with different foci depending on the genre school. The learning generated by these tasks in L2 students has been documented in the seminal work of Hyon (2001) and Cheng (e.g. 2011): Genre analysis helps students to recognize the contextual idiosyncrasies that underlie written texts, facilitating both reading, writing, and the ability to perform different genres (Yasuda, 2011).

Notably, tasks designed to promote genre awareness/knowledge may also incidentally promote metacognition. For example, the tasks described in Johns (2015) prompt students to appreciate the varied and contextual nature of genres, verbalize what they think they know and do not know, or reflect on past writing experiences. These types of prompts—requiring verbalization of relevant knowledge, summarization, recall, and knowledge assessment – are typical heuristics for metacognitive training (Serra & Metcalfe, 2009). Therefore, if we agree that metacognition is an essential element of “more advanced learning” in the exploitation of genres (Devitt, 2015, p.46), we need to look at current approaches for metacognition instruction. The key question is how different types of tasks can purposefully promote both genre knowledge and metacognition.

Our tasks (see Appendix) can be described as *metacognitive scaffolds*, defined as any kind of tasks, tools, strategies and prompts that “enable students to develop understandings beyond their immediate grasp” (Azevedo & Hadwin, 2005, p. 368). Scaffolds can support various facets of metacognition, from activation of prior knowledge to evaluation, and promote different learning targets. The aim of our tasks was not to scaffold metacognitive monitoring during writing, but rather scaffold metacognitive knowledge, i.e. help students access, verbalize and conceptualize *what they know about written genres*, and most importantly, *how they use this knowledge in making decisions in their writing*. Both tasks therefore seek to help students build and integrate the various facets of genre knowledge (see Fig. 3), and make this knowledge visible and relatable to their own writing practice, i.e. metacognitive.

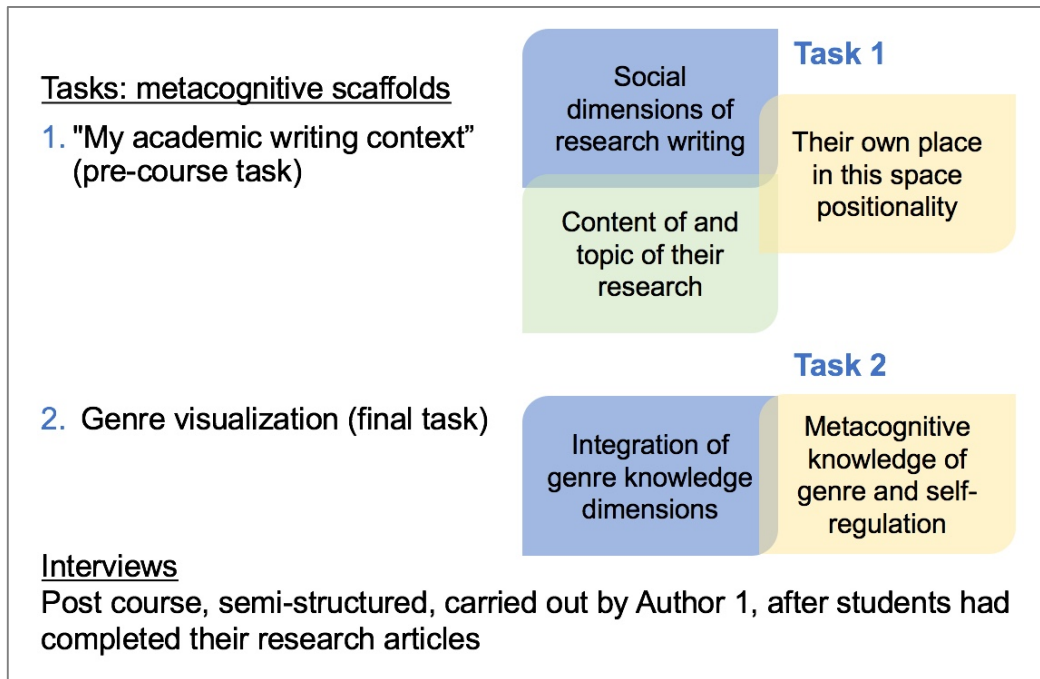


Figure 3. Pedagogical and data collection tools

Thus, the first task aimed for students to activate relevant facets of prior genre knowledge, relate this knowledge to their own practice, and help them summarize and reflect on this knowledge, echoing van de Kamp et al.'s "orientation of metacognitive knowledge" (2016, pp. 553). We sought to scaffold students' verbalization and integration of rhetorical genre knowledge and content knowledge *before* they engaged in genre analysis or writing, to make this knowledge metacognitive. Specifically, we wanted to set the stage for "a more complex context-driven procedure for genre analysis ... repurposing genre only after having identified the values, goals, material conditions, expectations, and repertoires of a discourse community which values that genre" (Askehave & Swales, 2001, p. 208, quoted in Johns, 2015, p. 114). The social and contextual aspects of genre production are difficult to teach, since they are unique to each student and span knowledge of reader expectations, disciplinary values, and communities. Thus, departing from familiar territory (their research topic), the idea was to push students to articulate their writing context, readers' expectations, and their own position in this research space. In terms of metacognition, this task asked the students to a) explicitly verbalize their knowledge of the above-mentioned aspects; and b) position themselves in this context, engaging in metacognition on how the above aspects of genre have a bearing on their own research writing practices.

Again, aligning with van de Kamp (2016), the second task aimed to help students integrate what they had learned about genres, conceptualize this knowledge, and evaluate it in the light of their own writing experience. Thus, task 2 was designed to help learners verbalize, integrate, and crystallize the different facets of genre knowledge acquired—important steps in making this knowledge metacognitive and thus accessible for future tasks. In metacognition training, "summarization" is a typical heuristic (Serra & Metcalfe, 2009), requiring students to verbalize what they know and have learned about a topic (in this case genre and research writing), and think about how this knowledge can be used in their own practice. Our task included both a visualization and a reflection, since combining two different heuristics is conducive to improving metacognition accuracy (Serra & Metcalfe, 2009). Reflections have already been found to promote genre awareness (Curry & Oh, 2012). The visualization was motivated by several considerations. From a metacognitive point of view, visualizations are useful metacognitive strategies (Pintrich, 2000), offering an alternative to verbalization. In

assessment, visualizations help students distil conceptual knowledge and see interrelations within a conceptual domain (Rittle-Johnson, Siegler, & Alibali, 2001). Finally, we believed that this scaffold would suit writers in scientific domains, since visual representations are used for knowledge construction and invention in scientific fields (Curry, 2014).

The data generated by these tasks is complemented by interview data. We wanted to know if and how students reported using their “emergent genre knowledge” (Tardy, 2009) post course, i.e. if they were metacognitive about their use of genre knowledge. Interviews were conducted to investigate what happened during completion of the article, from two to six months after the course (depending on the individual), when the participants were about to or had just submitted it for publication. Interviews lasted around 30 minutes, and followed a semi-structured protocol (see Appendix). Students brought their completed article, which was used for stimulated recall (Gass & Mackey, 2000). Note that we did not assume a connection between what students reported in the interviews and the metacognitive knowledge elicited by the tasks, although our data in fact showed that some students established this connection. These two sets of data could have been analyzed and published separately, but their combined analysis provides a qualitative richness that would otherwise be lost, and we therefore present them together.

3.3 Data Analysis

Since metacognition cannot be disentangled from its cognitive object (Veenman et al., 2006), training metacognition cannot occur separately from training genre knowledge. We thus categorized as metacognitive knowledge any explicit verbalization of genre knowledge (in all its facets) and how it bears upon and is used in the students’ own writing practice.

The data collected from the three sources were analyzed in a recursive cycle of four steps of coding and analysis (see Appendix) using Tardy’s (2009) framework as a heuristic. Our method aimed for systematicity and trustworthiness, and entailed a recursive reflection on our own interpretation (Charmaz, 2006). Our strategies for data analysis included exploratory open coding, constant comparison between researchers and in the data, axial coding to derive themes, and a final round of comparison to verify the accuracy of the account in our results. These techniques were useful to derive an interpretative account of emergent themes across students and data sources from the bottom up, beyond the categorization afforded by Tardy’s (2009) framework.

The first phase was an analytic pilot to establish agreement and systematicity in the treatment of the data across researchers. We independently coded the data for two students, keeping an analytic memo. We then discussed our coding and our memo annotations. One of the main difficulties we faced was the overlapping areas of genre knowledge (as Tardy concedes). Nevertheless, our memos reported very similar observations; for instance, we both coded many comments as “belonging” or “choice”. These words became a strategy for the identification of themes in our data. Next, we analyzed all data to obtain a narrative account highlighting common themes, using students’ own words where possible: what seemed to be happening in the data (see Saldaña, 2011, pp. 141-142).

This procedure was repeated with the interview data. At this stage, we were also able to compare our interpretation with the account derived from the analysis of the metacognitive scaffolds, to find connections with previously identified themes, and derive additional ones that emerged from the interviews. Finally, we returned to our data sources to identify supporting examples and corroborate our interpretation, verifying trustworthiness and identifying key points relevant for discussion (Charmaz, 2006).

4. Findings

We present our findings in connection to our research questions. Section 4.1 focuses on the metacognitive scaffolds, and Section 4.2 on the interviews. Students are referred to as Participant (P) 2-9 throughout the article.

4.1 Metacognitive tasks to scaffold genre knowledge

RQ1. To what extent and how does the implementation of metacognitive tasks enhance students' development and integration of various facets of genre knowledge? (content, rhetorical, process, and formal knowledge)

The two tasks aimed to scaffold students' development and integration of genre knowledge, and at the same time make it metacognitive, i.e. encourage a reflection on how they used this knowledge in their writing. Various themes emerged, suggesting an integration of various facets of genre knowledge (see Fig. 4). Below we illustrate these themes in connection to each task.

Genre knowledge themes elicited by the metacognitive tasks	
<u>Writing context</u>	<ul style="list-style-type: none">▪ Making connections: topics and journals▪ Making connections: topics and readers▪ Belonging to a field
<u>Genre Visualization</u>	<ul style="list-style-type: none">▪ Visualization as a synthesis of learning: integrated genre knowledge, possibility and choice▪ Genre knowledge as a tool for writing

Figure 4. Emergent themes from the data analysis – metacognitive scaffolds

4.1.1 Task 1: Writing Context

This task asked students to provide a short account of their writing context, focusing primarily on topics of interest, readership, and the significance of their own work.

Making connections: topics and journals

For some students, the first task elicited primarily an explanation of their research topic (content knowledge). These students also explicitly discussed how their own research fits into this panorama, and made connections between specific disciplinary content and journals in their field (rhetorical knowledge).

For instance, P4 begins the response to the task by giving an overview of her topic:

“Driver distraction and other forms of inattention are significant and difficult road safety problems since they are one of the major factors contributing to X. Having a solid evidence base from which to develop countermeasures is a cornerstone of Y.” (P4)

The student then points out her contribution to the field, and explains why this contribution may be relevant to specific journals, and therefore impacts on her decision about where to submit her writing:

“My contribution to the above field is in the analysis of a real-world data on the role of X and Y as contributing factors in Z and critical events for G and H. The result of the analysis might prove important in developing

effective interventions. . . . **For that reason, I would like to submit a paper in the journal of X.** This journal provides wide coverage of the general areas relating to X and Y ... Published papers deal with medical, legal, economic, educational, behavioural, theoretical or empirical aspects of X." (P4)

In the quote above, P4 shows metacognitive knowledge of the contribution to the field offered by her research, how this motivates her choice of journals, and why (broad range of applied topics).

P9 also departs from a discussion of his research topic (content knowledge) to explain the contribution and how the work fills a gap in the field. He then connects this knowledge to relevant journals. As with P4 above, the response to the task begins with an explanation of the topic and previous research:

"X is important to understand and control, be it a desired detect of an industrial process, or a failure to be prevented. Due to the importance of X, **considerable research efforts have been devoted** to development of numerical models." (P9)

Based on this overview, the student demonstrates metacognitive knowledge of how the different foci of various journals in his field relate to his specific topic, and positions his contribution against this background:

"Among the journals publishing such papers, (Journal Title) and (Journal Title) and (Journal Title) are popular. (Journal) is sometimes considered to be slightly more mathematically oriented, **whereas (Journal) has a more pronounced engineering focus** . . . Among the challenging and unresolved issues, X is an active field of research. **A contribution to this field of research is given by the present work.**" (P9)

For these students, the content and topic of their research provided an entry point to thinking about social dimensions of writing (here the journals) and their own place in this research space. Thus, Task 1 enabled them to verbalize a relatively sophisticated knowledge of journals, topics (genre knowledge), and how it impacts their own writing (metacognition).

Making connections: topics and readers

A second group of students also departed from a description of research topics in connection to journals and disciplinary interests. In addition, they conveyed a focus on readers' expectations in varied research communities together with explanations of research writing practices (including their own) and, as for the previous group, comments about their contribution to this panorama. For example, P2 begins with a description of his research area, but quickly moves on to the different communities that comprise his audience:

"I'm working with X. Most of **my audience** who I'm writing for are from the same industry, but maybe from different parts. There are numbers of **researchers who work with the same topic,** for them the level of **expectations are higher** compared to other and **maybe they want to see new results.**" (P2)

P2 then explains how he ensures his writing meets the expectations of his journal's readership, and how his work is relevant to this community, thus showing metacognitive knowledge of how his topic, his readers' expectations and previous publications (genre) help him set goals (meet expectations for novelty) and accommodate to the community in his writing:

"By taking a look at the previous publication in the same journals I can see level of expectations and the style of writing before I hand in my papers especially how all figures and tables should be presented . . . **My work is relevant for these journals** and scientific community based that has been presented in this community." (P2)

Another student, P3, begins the task by explaining his topic of research, and already in the first sentence explains and situates his work in relation to a neighboring field:

"To roughly describe my research field, I would say that **we look** at different techniques to X. . . . Some researchers focus on the larger process . . . **My field** falls into the narrower approach, **I tend to look** at separate machines in order to investigate (description of aims)." (P3)

Similarly to P2, in the quote above he conveys metacognitive knowledge of how audience interests relate to his writing and his position in the research field. This is based not only on the topic, but also on an integrated knowledge of other facets of genre:

“My audience is in essence, other researchers who are looking at similar machines or using the Y to model similar X flows or Z. This means that **the structure for most articles in my field is almost always the same**, each writer taking their notes from previous headings and data commentary.” (P3)

Some of the comments above index “belonging” in that students situate *themselves* and their writing practices within their research communities—this is a facet of metacognitive knowledge (who I am and where I stand). Belonging is explored further in the next section.

Belonging

Belonging—knowing where you stand in a research community—emerged clearly from some students’ response to the task. P8’s first sentence suggested this theme:

“My field of research is physics . . . I **belong** to two larger partially overlapping communities.” (P8)

The rest of this student’s narrative continues along this vein, weaving together all facets of genre knowledge. For example, in describing his writing context, P8 repeatedly *situates himself into the account* (metacognition) and effectively maps his territory by connecting his subject-matter to research groups:

“The X studied in **my research group** are almost exclusively connected to one specific application . . . The actual X community is rather small, consisting of about 50-100 theoreticians and experimentalists worldwide, **and my research group has a leading role** in terms of the development of theory and simulation tools.” (P8)

Further, the student reflects on how readers’ expectations, connected to areas of specialization, influence the writing practices of his own research group (metacognition), integrating various aspects of genre knowledge:

“Given the mixed readership discussed above, **my group usually takes care to emphasize** the connection between our results and the bigger picture **when writing papers** . . . **We strive** to state our conclusions clearly and discuss the implications ... **Making the main points clear is a priority** ... and much effort is always spent on preparing manuscripts.” (P8)

The metacognitive dimension in the quotes above can be best appreciated by looking at another student. Prompted by the task, P7 integrates all the facets of genre knowledge in his response: research topic, rhetorical considerations and even disciplinary epistemology (genres and purposes), as well as aspects of process and form:

“One very particular aspect of the X community is **its focus on conference papers** rather than journal articles. Conferences are by far the most common way to publish results, which is probably motivated by the idea that computer science is a **rather new discipline where things evolve quickly**. This is even more notable in the more applied fields of the discipline ... Even in purely theoretical domains however, **journal papers are the exception rather than the rule, and are used to report only on the very best results**, possibly compiling or extending results previously published elsewhere. **Conference papers** are used to describe **complete results rather than work in progress as might be the case in other disciplines**. A very concrete consequence of **this publishing culture** is that **articles often have constraining length restrictions**, which may prevent the authors from giving as many details as they would wish. ... As a result, papers in the field of Z usually present a mix of theoretical results and experiments, some papers leaning more to one end of the spectrum or the other.” (P7)

Although, as with P8, this task elicits an “insider” account of his writing context and shows a very sophisticated genre knowledge, P7’s sense of belonging is conveyed implicitly and not reflected upon. The student does not explain how practices impact on himself as a writer.

4.1.2 Task 2 – Genre Visualizations

The second task aimed to scaffold students' integration and conceptualization of their emergent genre knowledge and make it metacognitive, using both visualization and reflection as metacognitive “summarization” heuristics (Serra & Metcalfe, 2009).

Visualization as a synthesis of learning: integrated genre knowledge, possibility, choice.

As intended, students used this task to conceptualize, synthesize and reflect upon what they learned in the course. There was of course variation; some students chose concept maps while some interpreted the visualization symbolically, metaphorically, and even humorously. While some students wrote long reflective commentaries in this task, some did not. Overall, students' comments suggested an integrated view of genre knowledge. Interestingly, some students reported that the most useful aspect of the course was gaining an awareness of conventions but also variation in their genres, and the element of possibility and choice inherent in research writing.

For example, P4 used a concept map with bubbles representing rhetorical considerations, such as the need to convince, the need for clarity, stance, audience awareness, and representations of formal aspects of genre (Fig. 5)

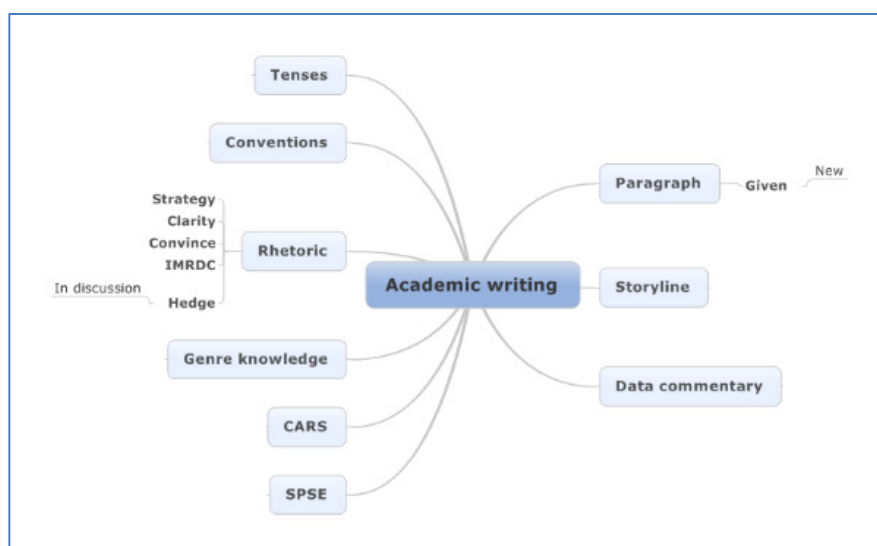


Figure 5. P4's genre visualization

Commenting on the image, the student explains in detail how these aspects will influence her writing (metacognition):

“The most important observations for future use in my articles are: a) Paragraph . . . b) data commentary . . . c) CARS . . . In general **I learned to be more critical** to the published research articles and **to use more strategically** . . . (follows a list of formal features of genres, e.g. parallelism, hedges and softeners).” (P4)

The student also explicitly points out a new awareness (metacognition) of possibilities and choice in her changed perception of academic writing:

“It made me aware of the possibilities in research writing and forced me to pay attention not only about what the authors did, but also how they write: **the style, story, conventions. As an engineer** one would like to have formulas and rules to follow, but in research writing it seems that **there is open field for discussion.**” (P4)

P5 devised a “story telling” visualization, where the actual process of carrying out research is metaphorically represented by a tree branching out, grown from the researcher's seed (Fig. 6).

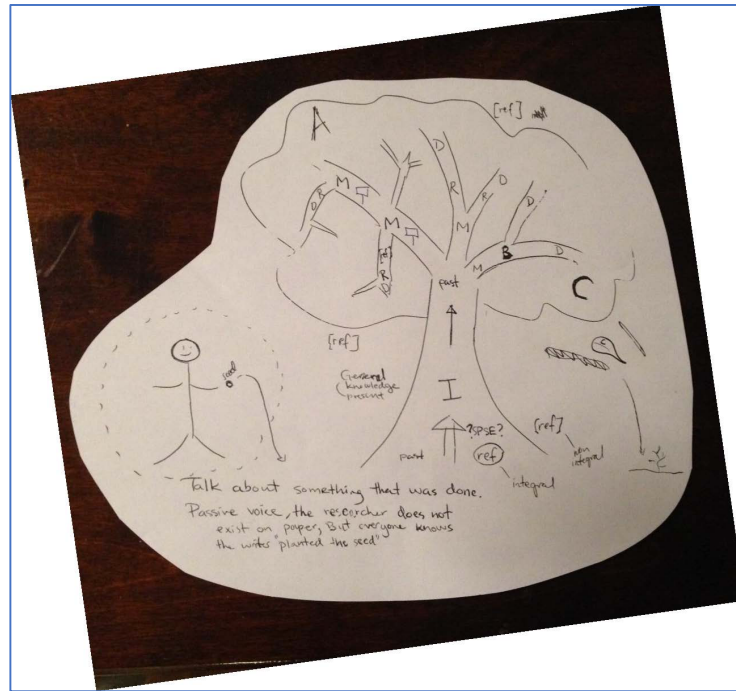


Figure 6. P5's genre visualization

In the commentary, P5 describes in detail how an article comes to life. Using the tree metaphor, she comments on specific formal features of the genre and the role of the author, suggesting metacognitive knowledge of the research writing process:

"Looking at my drawing, **the whole visualization starts with a person (the researcher) planting a seed.** By doing the research, the author of the paper plants the seed. **However, as soon as the seed is planted, i.e. the research is done, the person steps away and is not in focus any longer. In my genre, almost all papers are written in passive voice and the researcher is never mentioned.** This is where the attention moves to the tree (the article). The introduction (I) is visualized by the trunk of the tree because this is where the water and nutrients enter the tree. The trunk is broad and sturdy but becomes narrower higher up, resembling the form of the introduction which starts general and turns more specific as the literature is reviewed, a little like nutrients of the tree being filtered, either allowed to enter or rejected by the tree." (P5)

The description of her genre may seem abstract. But as this student realizes that she works in a field with strict conventions, she is metacognitive about how these conventions influence her own writing, and appreciates that she can now make active, thoughtful choices:

“With my visualization I wanted to show that **my genre** most often follows a clear IM(RD)C structure and it seems that **there is not much freedom there**. ... I don’t think that working with the genre analysis will influence my writing drastically because **I am probably already very influenced by my genre because it is very strict** and all the articles I read have very similar structure. However, **the genre analysis has helped me become aware of the trends in my genre**, so that I now **can make active choices and reflect on why I choose to write a certain way.**” (P5)

P8's visualization is a pie chart, each colored slice representing formal, rhetorical and/or procedural elements of the student's genre (Fig. 7).



Figure 7. P8's genre visualization

In the commentary, these features are related to the student's specific writing practice (metacognitive knowledge), as expressed in the initial sentence:

"I was quite surprised by the amount of variation across the different disciplines and genres, especially in terms of structure. To me it seems natural to tailor the structure of the article to the content, rather than relying on a rigid set of sections (**I guess I am a product of my genre**)."

Integrating genre knowledge, conventional features of the genre—such as style, structure and content—are connected to the reader-writer relation:

"The turquoise slice illustrates that **the use of \we" is very common. My hypothesis** is that this started with **the reader being "brought along"** (...) establishing a connection between the author ("guide") and reader ("pupil" or perhaps rather "interested peer") to **make the reader feel invested** in the proceedings." (P8)

This student remarks on how the structure allows for authorial freedom, and once again seems metacognitive about the possibility of deliberate authorial choice (in this case, of following convention):

"the paper structure is very loosely controlled - **there is great freedom in choosing how to package the same material** (illustrated in the orange slice). The only sections that are standardized are the Abstract, Introduction and Conclusions ... **In my future writing, I will definitely keep these insights in mind. I perceive the rules and conventions of my genre to be quite utilitarian, and have no immediate desire to change any of them.** Therefore, I will most likely conform to essentially all of the conventions above." (P8)

The clearest example of genre knowledge integration is P9. This student storyboarded the research writing process as a journey of discovery in his field via four vignettes (Fig. 8).

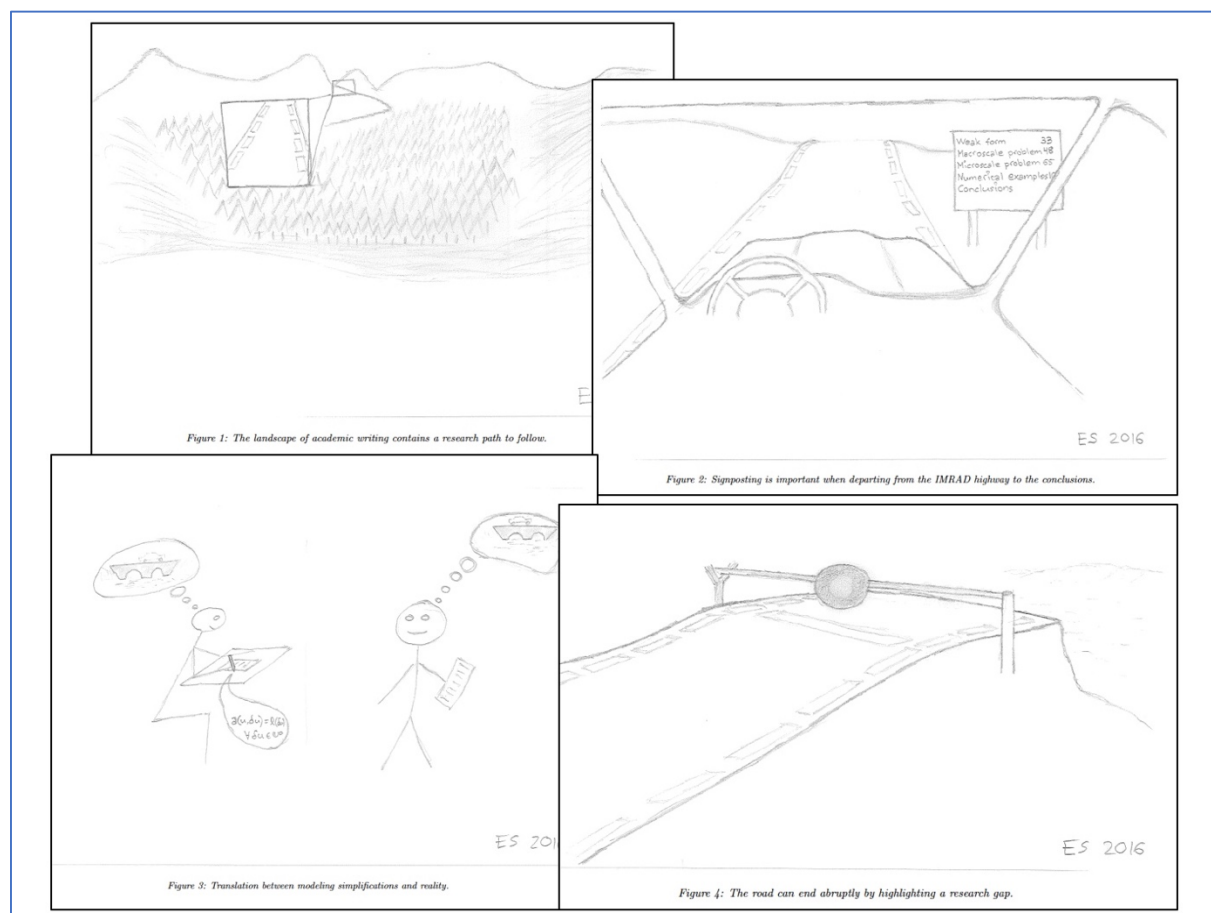


Figure 8. P9's Genre visualization.

In the first paragraph, the student connects disciplinary goals, readers' expectations, rhetorical choices and formal features of his genre. Furthermore, we find a truly insightful reflection on why these genre features are germane to the epistemology of his field:

"(papers in my field) in general, not adhere strictly to the IMRAD structure. **The reason for not following this structure is probably inherent in the type of research conducted in my field.** ... For example, investigating the effects of a certain model is the purpose of many papers, **much effort is devoted to model development and, hence, the method can be the most important result** ... Even though this can be a problem if too much information is omitted, **it also gives the author freedom in choosing** what aspects of a model to discuss." (P9)

The quote above also illustrates that the student has metacognition of where freedom lies within conventions. *Choice* is very evident in the entire second paragraph of his commentary, which demonstrates metacognitive knowledge in that a critical review of his genre conventions is presented *through the prism of his own authorial preferences*:

"**Choosing between these two strategies, I will let the purpose of my paper determine the choice in my future writing.** . . . In any case, **I like** the signposting in the end of the introduction . . . **In my opinion,** this outline offers a possibility to comment on different parts of the paper . . . Leaving the introduction, **we now turn our attention** to data commentary, which is often combined with discussion of the results **in my field.** Discussing numerical results when they are presented is, **in my opinion,** reasonable in order to avoid confusion . . . when several simulations are presented in the same paper. **Hence, I do not plan** to implement large changes to my writing of the results section (**but I will, of course,** attempt to improve flow and style) . . . **Personally, I would like to see** more such discussions, **because it creates awareness of the simplifications** that come with different models. **Hence, I will try to include such discussions in my writing.**" (P9)

P7 also notes possibility and choice. While this student does not explicitly relate his observations to his own writing, the reflection shows metacognitive knowledge of his perception of academic writing and the authorial choices it entails, including presumably his own.



Figure 9. P7's Genre visualization

"This visualisation describes **what I think are some key components for good academic writing**. The first is being able to efficiently **use rhetoric to communicate your point**. One might think that scientific writing should remain neutral, and that rhetoric should have little to do with the quality of the paper, but it is far from the case. **A scientific writer must know when to take certain stances** . . . the last one (bird picture in visualization) is a **humorous illustration** of the fact that **the best authors are the ones who have learned the rules, but also how to break them efficiently, to make their text more memorable to the readers/reviewers.**" (P7)

Great emphasis is placed on persuasion, stance, and reader awareness. This includes considerations of the fact that (expert) writers establish a voice and bend conventions in an "efficient" way in their own writing. This rebelliousness is portrayed by the bird on top the "birds prohibited" sign (Fig. 9).

Genre knowledge as a tool for writing

Remarkably, almost all the students conceptualized the observed genre conventions as useful *tools* for writing, thereby suggesting metacognitive knowledge of how genre conventions play a role in their own writing process. For two students, observed genre features became a method or "road map" to structure their writing process. To illustrate, P3's visualization is a concept map that depicts related research interests in his field, which he uses to point out his research niche.

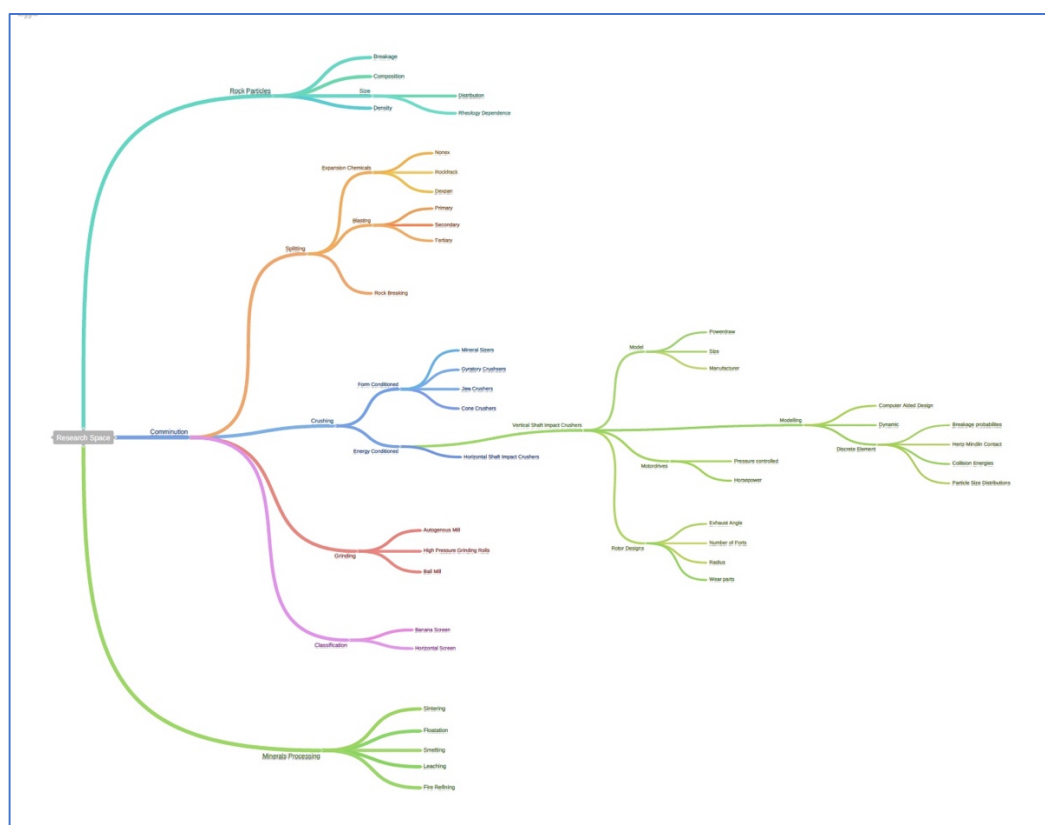


Figure 10. P3's Genre visualization

This student then explains how the CaRS model (Swales, 1990) and SPSE may be adapted to his future writing in these different research areas, and help him move forward in his writing process:

“When it comes to writing about these different areas, I think that the CARS model will be the most powerful framework for me going forward. It helps me immensely to structure my paper ... I don't think I will use SPSE all that much during the early stages of writing papers. It might be more useful when writing abstracts since it essentially forms a checklist of items that should be included in the often limited segment.” (P3)

The focus on process is evident in P6's visualization, a “moves map” (Fig. 11).

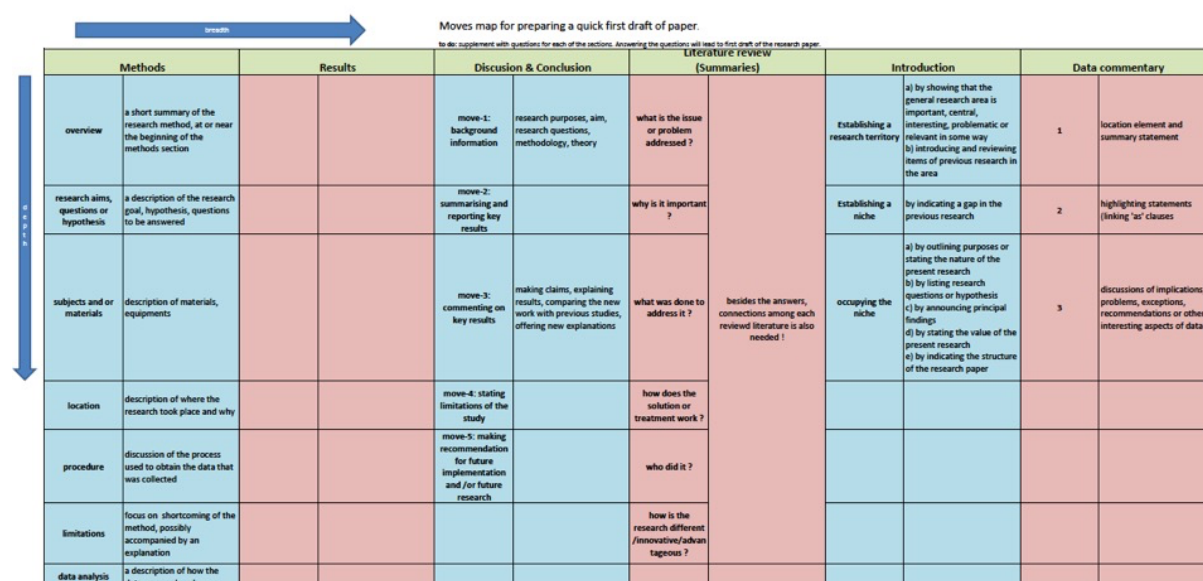


Figure 11. P6's Genre visualization

In the map, the x axis represents the writing process and the y axis represents prototypical rhetorical moves observed in his genre. The cells contain prompts to monitor the completion of these moves:

“This “moves sheet” is a 2D representation of the papers I write. Along X axis is the progress of the overall paper and along Y Axis is the depth of the paper. . . It is intended to prepare very quick first draft of the paper with key information necessary written in the first draft itself.” (P6)

In the reflection, the student then explains how the map not only helps in the first drafting of the article (metacognitive knowledge of strategies), but also, importantly, helps him feel more effective and less stressed about writing:

“I created a moves map so that I would be able to tick off what are essentially needed in a paper and make sure that they are included in the first draft itself. This is very much engineering practice and not quite ‘writing’ though I think this will help me get going with writing a paper just like I do any other day engineering task at the office. Otherwise I experience a “waiting-for-muse” which is very unproductive and stressful.” (P6)

To conclude this section, the overall picture that emerges is that these metacognitive scaffolds seemed useful in eliciting and enhancing various facets of students’ genre knowledge, as well as how this knowledge impacts on students’ writing (metacognitive knowledge). The first task activated prior knowledge of genres and prompted reflections on how this knowledge influences key writing decisions—from choosing where to submit articles and why, to the rhetorical framing of an article on the basis of readers’ expectations and affiliation to disciplinary community. The second task helped students consolidate their genre knowledge, prompted reflections on how this knowledge had been enhanced during the course, as well as how this enhanced knowledge has an effect on their writing strategies, such as planning, revision, and the use of genre conventions.

4.2 Interviews

RQ2. How do students report on the metacognitive use of their genre knowledge for research writing beyond the course?

In this section, we present how students reported using their genre knowledge metacognitively, in other words, how they monitored their writing process, and engaged with reader expectations, conventions, variation, and the possibility of strategic deliberate choices in their writing. Four overlapping themes (Fig. 12), which illuminate different facets of how the students reported using their genre knowledge, emerged from the interview data: 1) Genre knowledge as a tool in the writing process; 2) Genre knowledge as metacognition: thinking about writing; 3) Reading and readers; and 4) Possibility, variation and authorial choice. As the themes are clearly connected to points in the previous sections, we have attempted to be consistent in the naming, and use in-vivo coding whenever possible.

Genre knowledge themes elicited in the interviews

- Genre knowledge as a tool in the writing process
- Genre knowledge as metacognition: Monitoring, evaluating and thinking about writing
- Rhetorical genre knowledge: textual analysis, critical reading, and reader/audience awareness
- Variation, possibility and choice in writing

Figure 12. Themes emerged in the interviews with students after the course

4.2.1 Genre knowledge as a tool in the writing process

Generally, the students seemed very metacognitive about their writing process in the interviews. For example, when asked about the most useful aspects of the course, some students reported using their genre knowledge as a *tool* to expedite planning and constructing the research article. Various aspects of genre knowledge seem to have been adopted and adapted to the participants' individual needs, at different points in the writing process, and for different purposes. The clearest case is P6. As mentioned in the previous section, this student developed the visualization task into his own writing tool: a genre map with prompts about relevant rhetorical moves and discursal features for an effective paper. He comments:

"At the end of the course I made a moves map. ... It was this map that I used, and I still use it. Now I am going to develop (the map) in questions, so you answer the questions and that's a paper. Well, it's not as simple as that, but this is a very good starting point." (P6)

P3 also spotlights process. For example, when prompted to talk about his paper, he discusses the different steps taken in constructing the article, motivated by a number of considerations, from content to personal purpose, to rhetorical strategies. He then reflects on how he applied what he had learned through the course to develop his own writing process:

"In the introduction, I think that's where I used it the most . . . how I started out was basically seeing what articles and topics did I want to have in the introduction . . . And sort of structuring in a red thread... seeing how I am going to connect this rhetorically." (P3)

"I usually look at the data and the graphs and just write from there. It's more when you write the abstract, the method, and the introduction, that's where I used most of the tools from the writing course. That's where I thought maybe I didn't have that good skills in it before, so that's where I tried to apply that to sort of learn myself." (P3)

P2 also reports that his learning about research genres has changed his writing process, particularly planning:

"For me it's for the planning of writing. Because before maybe I did this the wrong way and start maybe with some introduction ... but it's much better to do all of the experiment, all the research and then come to the introduction part and write it." (P2)

4.2.2. Genre knowledge as metacognition: thinking about writing

This section deals with how students used their emergent genre knowledge metacognitively, for example, to monitor, evaluate their writing, and take further action in light of this evaluation. For some students, this metacognitive approach seemed to be a direct result of the course. P3's "eye-opening" captures this new consciousness nicely:

"It is probably unconscious that I write like that (referring to SPSE). I have that sort of structuring and it's also present in many articles as well. So, It's sort of like opened my eyes to it by learning about it. Cos it's been there obviously before, but it's not something I had thought about or internalized." (P3)

Genre analysis tasks undertaken during the course appear to act as tools in the writing process (see previous section) but also as a springboard for monitoring that process. Indeed, some students offered specific examples of how this metacognitive knowledge plays into their writing, from the revision of aspects of structure and flow, to decisions about content and rhetoric. P2's comment, for example, illustrates how what he has learned helps him recognize areas needing revision, and also how to revise:

"When I come back and take a look at my paper and just read one more time, I see ok this should be the other way, I should change it, and that is based on the things that I learned in this course, and it's really useful for me because this is first writing course." (P2)

P4 remarks about monitoring flow:

"I remembered the flow - like which is new and what is old so, and then to cover the new, **so I think I was more aware of that in writing my own paper.**" (P4)

In a similar vein, P5 talks about data commentary and highlighting statements, showing that formal aspects play a facilitative role in monitoring his thinking about how to present results:

"To think of how you connect the image to what you are writing ... I really like the discussion about not to have too much about the figure or too little, and also letting the figure talk for itself and not stating the obvious and stuff. **It's difficult to find those things (the highlights), but to think about it helps. You have something more to think about** that just writing down results." (P5)

P8 also notes that genre analysis (which he terms "scrutinizing") seems to have provided tools to monitor his writing more effectively, with the result that writing feels easier:

"I have thought a lot about trying to get better flow ... trying to make it a better text in that sense... And **it feels like it is becoming much better at the first attempt**, so it needs less revision...it seems like **it comes easier to me** or, as I said, it comes better on the first try. So maybe **all this scrutinizing in detail seems to work.**" (P8).

Similarly, P7 reports acquiring metacognitive knowledge of formal and rhetorical aspects of genre raised in the course, and appreciates having greater awareness of how these play a part in his writing:

"I don't think I used consciously some techniques I learnt but obviously **the SPSE structure comes quite naturally**. And always **mitigating what you say**, especially if it's negative, try to balance it with an explanation ... **I also find it very natural. Maybe it's good to have an increased awareness** and then it becomes more structured." (P7)

From a metacognitive perspective, the usefulness of the visualization task was explicitly highlighted by three students. For P4, the task helped her to "structure her thoughts" about what to take away from the course, and how to be more strategic in her thinking:

"It was more for me to structure the thoughts of the course. I think was a good exercise...to try to point what I should take from the course, for me, for this specific paper. The structure, the use of tenses, where and why, and also for references, auxiliary (reporting) verbs, **and to be more strategic in that part.**" (P4)

P5 reports that the visualization was helpful for summarizing her knowledge about her genres and to accurately evaluate her writing (in this case positive, as confirmed by her supervisor):

"I think it was very useful to be able to summarize it in the end so that you are like "okay, so it was these things... taking inspiration from the genre visualization, that 's how I have seen others do it in my genre... the introduction, that's the part that I worked mostly on with the course and it feels very good ... I went through it with my supervisor also **and it was nice cos he could notice that I had worked on it in that way, that it had a nice flow.**" (P5)

Lastly, P6 reports that the visualization task helped hone his metacognitive evaluation abilities by providing him with criteria (content, process, rhetoric and form) derived from genre analysis:

"I did the literature review myself: I observed what others (authors) I do, and then I recorded that as a procedure in this map. So in the literature review too I have a procedure ... **Personally I think the literature review I did in this paper is quite strong ...** is rather well organized and there are some original thoughts. ... **This is again possible because there is a procedure.**" (P6)

4.2.3 Readers and reading

A somewhat unexpected finding was how much students' reading was impacted by the course. For instance, P3, talked extensively about how he experiences reading differently; he no longer simply focuses on the content of the text, but also considers reader expectations and notices genre variation:

(talking about what he thinks about while reading) **"the expectation of the reader and how they write,** like in

different fields they write differently and focus on different things, and that's pretty apparent, even if you are just looking at neighboring topics." (P3)

P5 also reflects on how genre analysis has helped her to be more strategic in her reading and writing not only for retrieving content, but also as inspiration for her own discursual choices:

"when reading other articles then I have developed more skill in knowing what part of the article is giving me information ... I get inspiration from how other people have been writing and then you can see that they use these kind of, I don't know, strengthening words and stuff ... **like a different way of thinking when I read through articles.**" (P5)

The first task—the writing context—was mentioned by two students as being particularly useful, not in terms of developing their reading skills, but rather in developing metacognitive knowledge of their own readers, which they had not previously considered in a conscious way. P4 states:

"The first task ... I think that one I would never probably do myself otherwise ... try to explain why the research is important, and why I am targeting specific journals, because usually it just goes by default." (P4)

Likewise, P8 reports:

"the first description of the writing environment, that was kinda nice to realize I am trying to please three different crowds at once." (P8)

4.2.4 Possibility, variation and authorial choice

The final theme pertains to students' gaining metacognitive knowledge of heterogeneity among genres, and their own capacity to make writing choices. Some students remarked on both conventions and variation in their genres:

"I just added stuff, so the sections that were in there are still in there but there are some more . . . since in my field, the layout of the paper is sort of arbitrary, so it's not method, results, analysis." (P8)

"You don't presume that all papers should be pressed into a specific format, papers look different in different fields. Of course it helps to be aware of these differences from the start." (P9)

P3 in particular comments on genre variation from a diachronic perspective, by reflecting on how readers' expectations have changed over time.

"Articles, maybe from the 70s or 80s, ... or they are not made to be read in the same sense that the articles of today are written. They are more niche and assume more knowledge from the reader ... It's probably something that changes and something that will change even more... each field has their own type of language and their own assumptions about the reader." (P3)

Students also reported being metacognitive about making deliberate authorial choices, even when conventions were followed rather than broken. For instance, P5 suggests the importance of metacognition in the development of personal expression in academic communication:

"It is very easy to be stuck in a way of writing and not necessarily because that's the way you like it best, **but just that that's what you know ... But (it is important) to develop more your way of expressing yourself.**" (P5)

This sense of an authorial voice is also present in the words of P8. His comments indicate that he is purposeful, and therefore metacognitive about his discursual choices, as he aims to create stance and facilitate reading:

"I always try to be very specific in the conclusion and not be too modest, like not too many qualifiers that signal that it's maybe... possible ... **and I want it to be short** so that people if they are in a hurry they can read it and it's fine." (P8)

Making deliberate, metacognitive authorial choices was also reported by P9. The student conveys a very reader-oriented and analytical approach to writing, by repeatedly mentioning the need for positioning in the text and by motivating his own writing decisions.

"I start to **analyse my texts** more than I had done previously [...] Also I have started to **think more about positioning** in my text and **I tried to account** for who will probably read this." (P9)

Interestingly, for this student, genre analysis was a stepping stone towards authorial control, leading him to criticize intertextual practices of other authors in his community, and correspondingly gain metacognitive knowledge of his own citation practices:

"Often when you see introductions **people cite a lot of references** because they are playing the citation game, and **I tried to only include the references that I found relevant** for this work ... I think I made it much more precise this time, and **I was more careful about which aspects of the model are new.**" (P9)

5. Discussion and conclusion

The aims of our study were to a) implement metacognitive scaffolds in the genre-based research-writing class and investigate if/how they enhance students' development of genre knowledge in all its facets, and b) through interviews, explore if (how) students report using their genre knowledge metacognitively in their research writing, after the conclusion of the course.

Overall, the tasks seemed quite successful in pushing the students to integrate (Tardy, 2009) and verbalize various facets of their genre knowledge, which are key steps in the implementation of metacognition (cf. van de Kamp et al., 2015, 2016). Tardy's framework proved a useful heuristic to reveal this integration. The analysis suggested that our students responded to Task 1 (the writing context) by connecting their research topic to journals, to readers, and for some, by expressing a sense of belonging to their respective research communities. This was most marked in one student, P8, who interwove considerations about research groups, audiences, topics, writing practices and style. Task 2 (genre visualization) was mostly successful in fostering students' metacognitive knowledge of what they had learned about genres. The combination of two metacognitive heuristics (Serra & Metcalfe, 2009)—visualization and reflection—allowed the students to enter the task in different ways. For some students, the visualization was symbolic and/or metaphorical and was used as a stimulus for reflection (e.g. P7, P9). For others, it was really a distillation and conceptualization of genre, used as a tool in their writing (e.g. P3, P6).

Task responses were thus quite varied, as the students verbalized and re-interpreted their (emergent) genre knowledge in their own way. Some comments indicated metacognitive knowledge of what they knew about writing and genres, and how this played a role in their writing; some comments instead focused on their learning. However, the open-endedness of the instructions suggests some disadvantages. While instructions allowed for personal interpretation and creativity, it also meant that some students did not elaborate on how they were using their genre-related insights to the extent that we would have hoped. For example, P2 provided a limited and rather generic response to Task 2. P8 engaged fully with both tasks, yet found the visualization especially challenging, commenting in the interview: "it was a bit left-field in a sense (...) I found it difficult to do something really creative with that, specifically because you are trying to visualize very abstract concepts. It's hard to find a way to do that". This suggests that depending on the students involved, metacognitive training may need to be more prescribed and possibly broken down in smaller steps, without compromising space for personal interpretation. Further, using visualization as a metacognitive scaffold, or other forms of visual representation such as concept maps (Wette, 2017), may also require training, especially for non-visual learners.

The post-course interviews aimed to probe whether and how students reported using genre knowledge metacognitively in their writing. A limitation of our approach is that while interviews generated self-report data, they did not provide examples of the students' actual writing. Yet, some unexpected outcomes surfaced. For instance, students noticed that genre

analysis had an impact on their writing process. Belcher (2010, p.11) underscores the importance of process, and calls for “scaffolding techniques, as well as metacognitive and metadiscoursal awareness-building strategies”. Our findings are encouraging in that students reported employing genre-derived insights as “tools” to develop personalized writing strategies, which for some drastically changed their process (e.g. P3, P6). For others, writing became “easier” and less time-consuming (P8). Overall, all students reported using their genre knowledge metacognitively to plan, monitor and evaluate their writing. For some, it was an awareness of readership and rhetorical strategies deployed in their texts (P3, P9); for others, it meant a different way of strategizing the writing process (P5); for some, it meant gaining metacognitive knowledge of how convention and variation in their genres demarcate the possibility of making conscious, personal authorial choices (P9).

To return to our initial discussion of genre knowledge, genre awareness, and metacognition, we recall Devitt’s (2015, p. 49) observation that teachers need to encourage students to “make *deliberate decisions and conscious choices* as they write and revise” (emphasis added). Our study suggests that metacognitive scaffolds such as those we designed contribute to achieving this aim. At the same time, students’ level of proficiency, academic literacy, and course context need to be carefully weighted in making decisions about how to scaffold metacognition. Our doctoral students could be expected to have a good level of writing and knowledge of their field, hence the focus on metacognitive knowledge and integration of genre knowledge facets. For less advanced students, or for courses with specific learning objectives, it may be more relevant to focus on other aspects of metacognition, such as planning, or monitoring and control of writing strategies, possibly in combination with specific facets of genre knowledge and at subsequent stages in a course. Finally, we encourage teachers to be creative with metacognitive task design, beyond reflections: we used a metaphor (the writing territory) and a visualization, but metacognitive scaffolds could take many forms, depending on the focus (Azevedo & Hadwin, 2005): short verbalizations, lists, portfolios, video presentations, guided class discussions, and reflective dialogues. While genre teachers may already incorporate these ideas into their practice, our study underscores the need to look at the theoretical framework and the research on metacognition to inform task design and understand students’ learning.

In contextualizing these findings, we see some clear avenues for future research on metacognition and the development of L2 writing expertise through a genre approach. Transfer stands out as a fruitful direction. Metacognition, and especially metacognitive knowledge, is facilitative of transfer to new situations (Pintrich, 2002). In writing, metacognition of prior genre knowledge has been suggested as a potential facilitator of high-road transfer across contexts (Artemeva & Fox, 2010; Gorzelsky et al., 2016; Reiff & Barwashi, 2011). Given that some of our students explicitly described the metacognitive tasks as useful in reframing their thinking about research writing (and reading), a pertinent question for the future is: can metacognitive training in the genre-based classroom lead to transfer? Another avenue is the potential link between metacognition, genre innovation and creativity. To this end, metacognition training may take us beyond rhetorical consciousness raising towards consciousness *applying* (to paraphrase Swales, 1990). As writing contexts are ever-evolving, both genre awareness and genre knowledge development require teaching students the ability to recognize genre variations, adapt to them, and potentially innovate (Tardy, 2016). Ultimately, this necessitates metacognition: knowing what you know, and knowing how to use it.

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Appendix

Tasks aimed at eliciting students' metacognitive knowledge of genre

Task 1 Your academic writing context

Provide a short account (roughly one page) in which you describe your writing context, i.e. the research field or subfield in which your writing is situated—your “territory”—and how your work contributes to this scientific community.

In the first part, besides broader aspects of the field, you should also describe the specialized sub-field that you aim to address in your writing, and possibly even the journals or publication outlet(s) that you are considering for your article. Use the questions presented in seminar 1 as a departing point: who are you writing for? How much do you know about your audience? What are the most relevant topics and areas of research that are currently investigated? What kinds of expectations will your reader have about your text? Use the internet and do some browsing for information if necessary.

In the second part, you will then discuss how *you* as a writer fit into this scientific community: what is your research about, and how, in some way or another, does it contribute to generating more knowledge for your target audience? Why is your work relevant for this scientific community, either in terms of theory/methodology, or in terms of problems and issues with previous findings? The text should be written for a fairly general readership, but the analysis of the audience should be as specific and concrete as possible (e.g. the readership of a specific journal or specialized area vs. the field as a whole).

Organize the text in a way that you think is suitable and clear. Consider paragraphing and transitions.

Task 2 Genre visualization

Based on what you learned in the course about genre and rhetoric, and your observations of the genre characteristics tied to the specific scientific community in which you write, create a visual representation of academic writing in your field of research. Use your creativity: you can draw, use computer graphics, paint, use photos or symbols, but try not to use tables or diagrams.

Then, write a short reflection and commentary that explains your visualization. In your reflection, also describe what you think are the most useful concepts about genre that you learned in this course, what you observed in the articles you analyzed, how you used this knowledge in your writing, and most importantly how they will be useful to you in your future writing (2-3 concepts).

Interview questions

1. In retrospect (overall), now that you have (almost) completed your paper, is there anything that we covered in the course that you remembered and that you found useful in your writing?
2. (with their paper in front). Now to be a bit more specific: could you go through your paper section by section, and tell me if you applied any specific concept or strategy from the course, or from your own observations of the research genres in your field? (prompt explanations/clarifications as needed)
3. Thinking about the tasks we did (recall course tasks), was there one that was especially helpful or stays in your mind? Why?

(Possible further prompts) What are your thoughts on the final genre visualization task? Or Which task or assignment was most helpful in getting a better understanding of how academic writing is done in your research area?
4. Any other comment that you would like to make?

Overview of data analysis procedures

<u>Analytic steps</u>	Individual open coding of source	Comparison of individual coding	Joint axial coding to identify themes across participants
<u>Analytic strategy</u>	Memoing	Discussion of our interpretation by student	Concept mapping, first draft of the results by student

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